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(54) Title: WEAR RESISTANT GRINDING MACHINE COMPONENTS

(57) Abstract: Various grinding machine components are made of superhard materials, including certain machine grade ceramics, including such materials as carbides, nitrides, borides, oxides, oxynitrides, or any other ceramic component. The component may either be a solid piece of ceramic or wear resistant material, or may have an insert or a piece of the wear resistant material adhered to a metallic substrate base for use within the machine. Graded materials may also be used with a gradient from a 100% concentration of ceramic at one surface, and gradually changing into a 100% metal at the other surface, would be advantageous. These superhard materials overcome some of the previously experienced problems as they will hold closer tolerances and resist wear better than other materials.

AMENDED CLAIMS

[received by the International Bureau on 22 March 2004 (22.03.04);
new claims 2-14 added; original claim 1 unchanged (3 pages)]

- 5 1. A wear resistant grinding machine component, comprising:
 a grinding machine component made of a material selected from the
group consisting of carbides, nitrides, oxides, borides, ceramics, cermets, carbonitrides,
carbon diffused materials, including steel, nitrides, borides, oxides, other metals and surface
treated ferrous compounds.
- 10 2. An extremely high precision wear resistant grinding machine
component for a high precision centerless grinding machine, comprising:
 a grinding machine component having at least an exterior surface
comprised of an extremely rigid and very hard, non-flexing material selected from the group
15 consisting of ceramics, carbides, nitrides, borides, oxides, oxynitrides, carbonitrides, alumina,
cermets, carbon diffused materials, including steel, nitrides, borides, oxides and surface
treated ferrous compounds, and combinations thereof,
 wherein the at least exterior surface of the grinding machine
component may include a surface selected from the group consisting of the entire component
20 being made of a ceramic material, a coating of a ceramic material on a metallic substrate
base, a sleeve of ceramic material adhered over a metallic substrate base, a grinding machine
component made of a cermet material, and a surface treated metallic substrate base formed
into a grinding machine component.
- 25 3. The grinding machine component of claim 1, wherein the grinding
machine component is selected from the group consisting of tension rods, transfer ways,
spindles, spindle housings, pivot rods, threaded shaft rods, concentric shaft seals, lead screws,
and combinations thereof.
- 30 4. The grinding machine component of claim 1, wherein the grinding
machine component is non-flexing and maintains a very high tolerance of from about
0.000005 inch to about 0.000030 inch.

5. The grinding machine component of claim 1, wherein the grinding machine component enables a repeatability factor of from about 0.000005 inch to about 0.000030 inch.

5 6. The grinding machine component of claim 1, wherein the grinding machine component is made of a metallicly infiltrated cermet material made from a spongy ceramic and then infiltrated with a molten metal which is thereafter allowed to solidify within the matrix of the spongy ceramic.

10 7. The grinding machine component of claim 1, wherein the grinding machine component further includes a metallic component to increase the strength of the component.

15 8. The grinding machine component of claim 7, wherein the grinding machine component further includes a metallic component selected from the group consisting of cobalt, vanadium, chromium, manganese, nickel, copper, zinc, molybdenum, cadmium, indium, tin and combinations thereof.

20 9. The grinding machine component of claim 7, wherein the grinding machine component further includes a metallic component in a concentration of from about 1 to about 50 percent by weight.

25 10. The grinding machine component of claim 1, wherein the grinding machine component further includes a magnetic component including a component selected from the group consisting of powdered iron, niobium, yttrium and combinations thereof.

30 11. The grinding machine component of claim 10, wherein the grinding machine component further includes a magnetic component in a concentration of from about 1 to about 25 percent by weight.

12. The grinding machine component of claim 1, wherein the grinding machine component made of a surface treated metallic substrate base formed into a grinding machine component includes forming a hard surface layer on a ferrous alloy by a method selected from the group consisting of carburizing and carbonitriding.

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13. The grinding machine component of claim 1, wherein the grinding machine component made of a surface treated metallic substrate base formed into a grinding machine component by carburizing is accomplished by carburizing by a method selected from the group consisting of gas carburizing by placing in a carburizing gaseous atmosphere, 5 pack carburizing by placing all the with surfaces in contact with a solid compound, and combinations thereof.

14. The grinding machine component of claim 1, wherein the grinding machine component made of a surface treated metallic substrate base formed into a grinding 10 machine component by carbonitriding by dissociating ammonia into hydrogen and nitrogen.